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Interplay between interaction and (un)correlated disorder in Heisenberg spin-1/2 chains FRIEDA DUKESZ, MARINA ZILBERGERTS, LEA SANTOS, Yeshiva University — We consider a Heisenberg spin-1/2 chain and study the interplay between the Ising interaction and on-site disorder, while keeping the hopping amplitude constant. Disorder is characterized by both: uncorrelated and long-range correlated random on-site energies. The level of delocalization, quantified by the number of principal components, is largest in clean systems with non-interacting particles. However, in the presence of uncorrelated disorder, delocalization becomes maximum for a non-zero value of the interaction amplitude. The inclusion of long-range correlated disorder may further extend two-particle states, but the effect decreases with the number of excitations and strength of the interaction, and may even be reversed, as shown for half-filled chains. Quantum correlations, determined by a global entanglement measure, present similar behavior, but the largest value appears for clean systems with interacting particles.

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